IOWA DEPARTMENT OF NATURAL RESOURCES

Iowa's 2016 Forest Health Highlights

December 2016
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This project was funded in part through a grant awarded by the USDA, Forest Service, Northeastern Area State and Private Forestry.

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Iowa's Forest Health Highlights

Introduction

Each year the Iowa DNR Bureau of Forestry cooperates with numerous agencies to protect Iowa's forests from insects, diseases, and other damaging agents. These programs involve ground and aerial surveys, setting up pheromone traps, following transects for sampling, collecting samples for laboratory analysis, and directing treatments for specific problems during the growing season. After each growing season, the Forestry Bureau issues a summary report regarding the health of Iowa's forests

This year's report begins with a brief summary of weather events, Iowa's land characteristics, and several survey summaries for insects, diseases, and invasive plants that have the potential to impact the health of Iowa's forests. The 2016 Forest Health Highlights will focus first on the Forest Service's Major Forest Pest List (Page 6) and then cover the additional damaging agents that DNR surveyed.

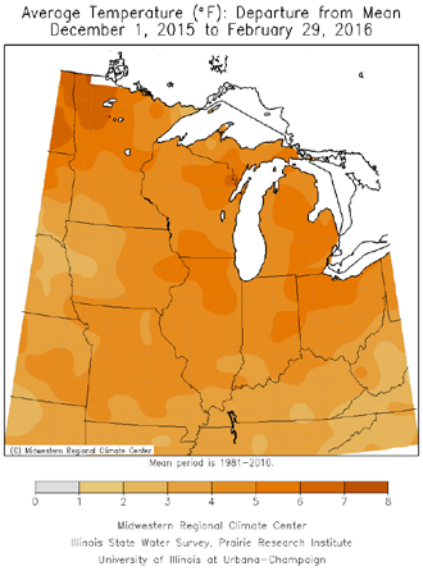
Weather Review

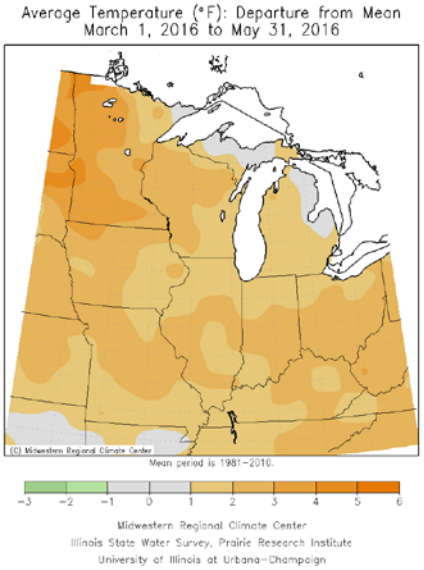
This winter brought about several challenges for Iowa with warmer than average temperatures and higher levels of precipitation. The warmer temperature (2-4° warmer than average) had several days in January that went above freezing, which caused many conifers to break winter dormancy. The repeated breaks in winter dormancy allowed for winter desiccation and eventual tree death in many conifer species throughout the state.

The entire state experienced a much warmer than normal spring with most all of Iowa receiving normal rainfall events. The warmer wet spring helped encourage the occurrence of Anthracnose (a fungal leaf disease) on sycamore and many other benign fungal leaf diseases throughout the state.

Most of the state experienced normal summer temperatures and summer rainfall events were much higher than normal statewide. The prior year's drought conditions were eliminated by consistent statewide rainfall. Parts of Northeast Iowa and Southeast Iowa experienced severe flooding conditions. The continued summer rains exacerbated the fungal leaf diseases and numerous reports of bur oak blight were made, in addition to frequent benign fungal leaf diseases that were being reported.

DNR will continue to monitor the winter effects on the conifers in Iowa. The reports of winter desiccation have doubled since the 2015 Forest Health Highlights, despite the consistent rainfall. Many conifers are unable to maintain dormancy during the winter months with temperatures fluctuating above and below freezing. The problem of winter desiccation, commonly called winter burn, is likely to continue into the future with non-native conifers or conifers planted on poor sites. Arborvitae, also known as white cedar, is an example of a conifer that tends to be impacted by the fluctuating weather patterns and winter desiccation is commonly reported with in the past several years.


Average Temperature (°F): Departure from Mean
December 1, 2015 to February 29, 2016
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
0 1 2 3 4 5 6 7 8
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign


Average Temperature (°F): Departure from Mean
March 1, 2016 to May 31, 2016
(C) Midwestern Regional Climate Center
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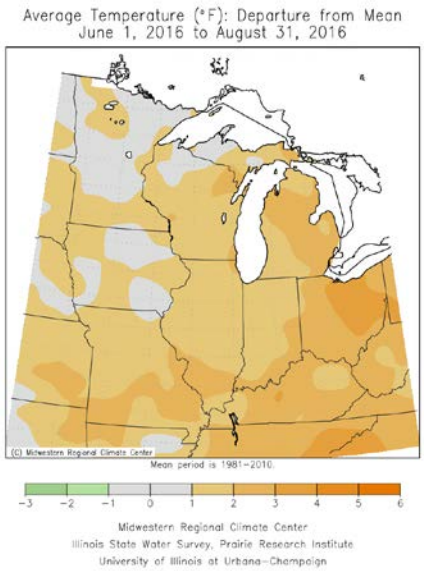
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign


Average Temperature (°F): Departure from Mean
June 1, 2016 to August 31, 2016
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
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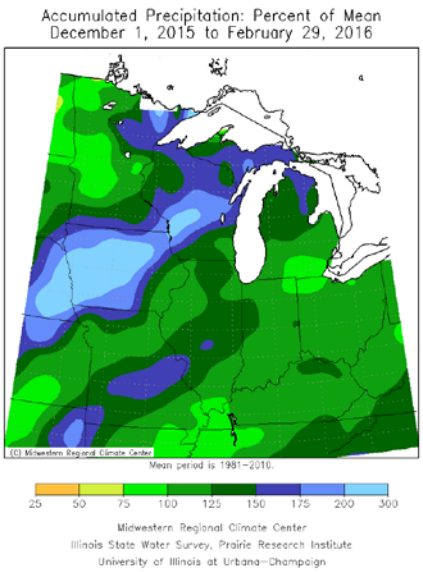
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign


Accumulated Precipitation: Percent of Mean
December 1, 2015 to February 29, 2016
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
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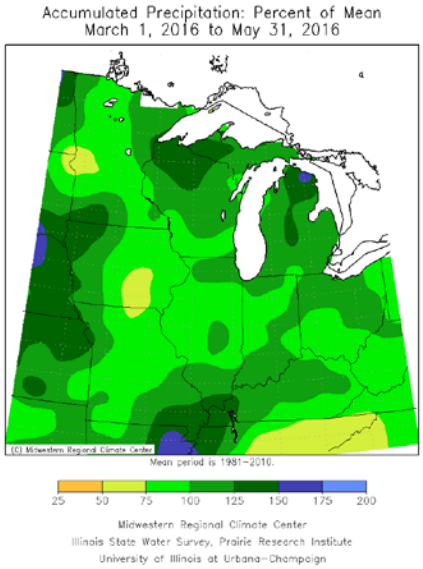
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign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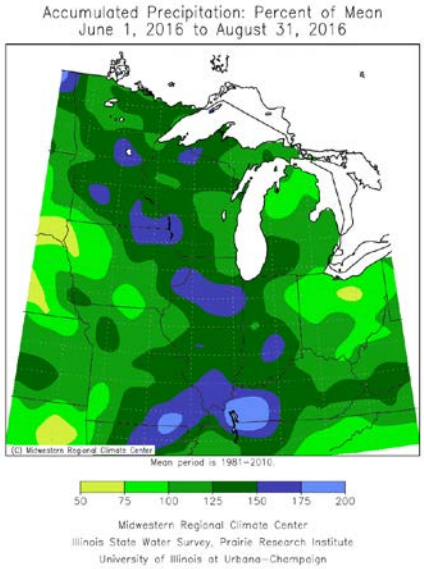
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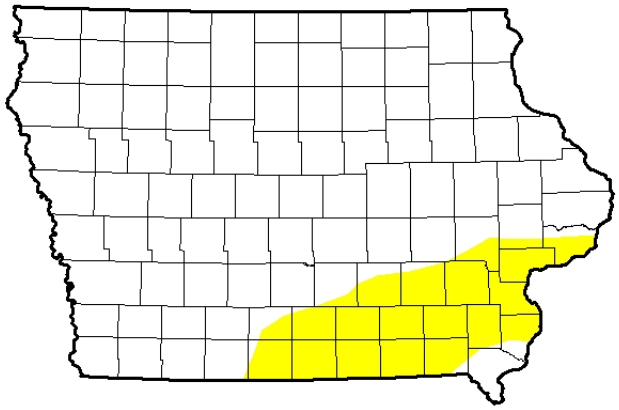
June 1, 2016 to August 31, 2016
(C) Midwestern Regional Climate Center
Mean period is 1981–2010.
50 75 100 125 150 175 200
Midwestern Regional Climate Center
Illinois State Water Survey, Prairie Research Institute
University of Illinois at Urbana–Champaign

[Images provided by Midwest Climate Watch]

U.S. Drought Monitor

Iowa



November 15, 2016

(Released Thursday, Nov. 17, 2016)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	85.34	14.66	0.00	0.00	0.00	0.00
Last Week 11/8/2016	93.22	6.78	0.00	0.00	0.00	0.00
3 Months Ago 8/16/2016	85.80	14.20	1.12	0.00	0.00	0.00
Start of Calendar Year 12/29/2015	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year 9/27/2016	95.07	4.93	0.00	0.00	0.00	0.00
One Year Ago 11/17/2015	84.21	15.79	2.02	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCEI/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

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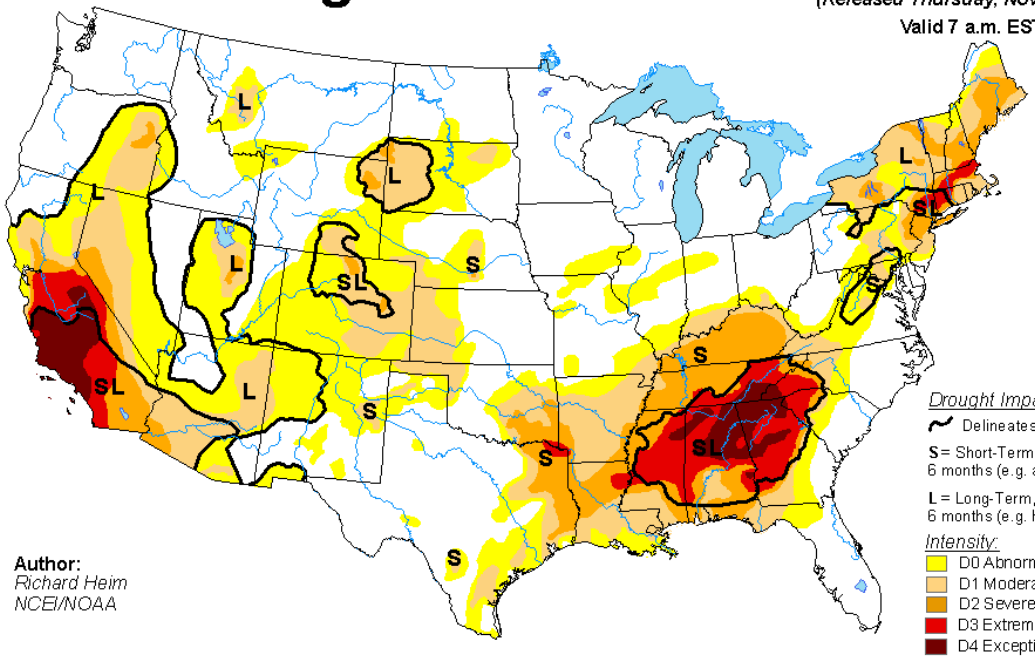


Author:
Richard Heim
NCEI/NOAA

Drought Impact Types:

Delineates dominant impacts

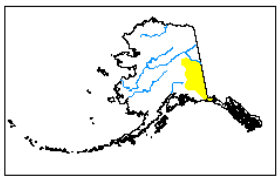
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

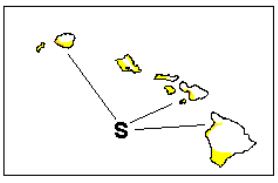
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

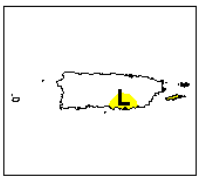
Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.







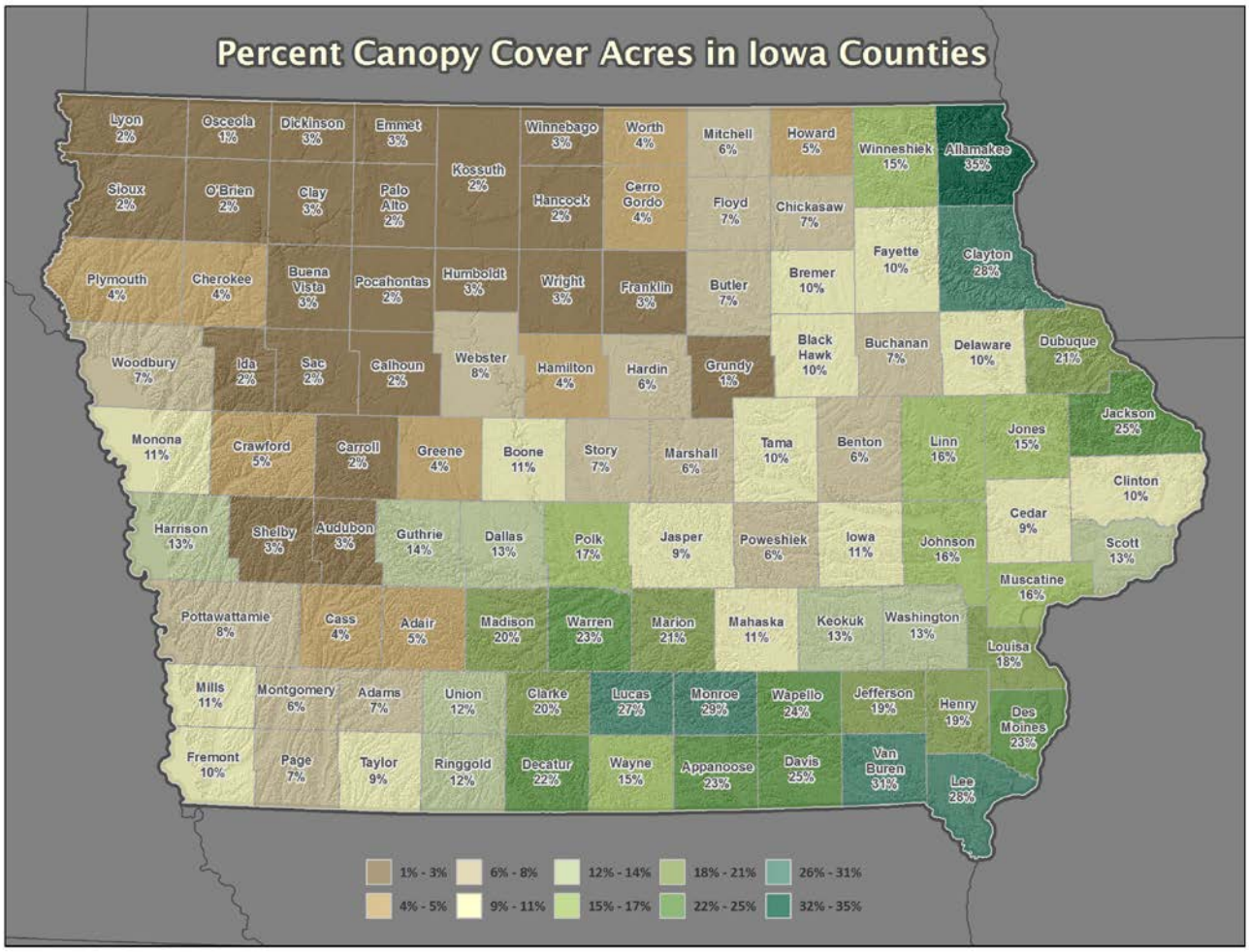
http://droughtmonitor.unl.edu/

Land Characteristics

Iowa has approximately 2.85 million acres of forested land representing a decrease from 3.1 million acres in 2012. Most of Iowa's forests are native hardwood with oak, hickory, maple, basswood, walnut, ash, elm, cottonwood, and many other hardwood species. Less than 3% of Iowa's forests are conifer forests. There are currently 1.06 million acres of oak-forest in Iowa.

Nearly 95% of the Forest Inventory Analysis (FIA) plots found one or more invasive plants competing with natives. The data also showed that over half of the live trees in Iowa are the preferred tree species by the nonnative pest gypsy moth. In addition, the average annual tree growth has declined while the average annual tree mortality has increased. Much of Iowa's small forests and trees in fence rows have been cleared to allow for more profitable row cropping. The FIA data also indicated that succession to shade tolerant hardwoods (maples/ironwood) replacing shade intolerant hardwoods (oak/hickory) is continuing. These are alarming forest health trends. (Miles, P.D. Wed Mar 25 20:46:53 MDT 2016. Forest Inventory EVALIDator web-application version 1.6.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.)

Currently, there are 186 businesses in Iowa which utilize the wood grown in Iowa's forests. The forest products industry contributes over $3.9 billion each year to Iowa's economy, including over 18,000 jobs for Iowans (Analysis by E.M. (Ted) Bilek, Economist, USDA Forest Service, Forest Products Laboratory, Madison, WI). Additional details can be found on page 192 of *Iowa's Forest's Today*.



United States Forest Service Major Pests List

This is a national list. Pests highlighted in red do not pertain to Northeastern Area and do not need to be reported. The items in blue have no known impact in Iowa at this time.

Non-Native Pests

Asian Longhorned Beetle
Balsam Woolly Adelgid
Beech Bark Disease
Browntail Moth
Butternut Canker
Dogwood Anthracnose
Emerald Ash Borer
Goldspotted Oak Borer
Gypsy Moth
Hemlock Woolly Adelgid
Laurel Wilt
Oak Wilt
Port-Orford-Cedar Root Disease
Sirex Woodwasp
Sudden Oak Death
Thousand Cankers Disease
White Pine Blister Rust
Winter Moth

Native Pests

Armillaria Root Disease
Aspen Leafminer
Bur Oak Blight
Douglas-Fir Beetle
Douglas-fir Black Stain Root Disease
Fir Engraver
Forest Tent Caterpillar
Fusiform Rust
Heterobasidion Root Disease
Jack Pine Budworm
Jeffrey Pine Beetle
Large Aspen Tortrix
Mountain Pine Beetle
Northern Spruce Engraver
Pine Black Stain Root Disease
Polyphagous Shot Hole Borer
Port-Orford-Cedar Root Disease
Southern Pine Beetle
Spruce Beetle
Spruce Budworm
Subalpine Fir Mortality
Western Five-Needle Pine Mortality
Western Pine Beetle
Western Spruce Budworm
Yellow-Cedar Decline

United States Forest Service Major Pests List: Armillaria Root Disease

Year: 2016
State: Iowa
Forest Pest
Common Name: Armillaria Root Disease
Scientific Name: *Armillaria spp.*
Hosts: Hardwoods and Conifers
Setting: N/A
Counties: N/A
Survey Methods: Ground
Acres Affected: N/A
Narrative: Armillaria root disease is fairly common in Iowa. The crown symptoms consist of branch dieback and crown thinning. The fungi produces a mycelial fan in recently killed trees just underneath the inner bark that often have a strong "mushroom" odor. The most common sign are the rhizomorphs that are produced just under the bark, and sometimes just on the bark surface. The rhizomorphs look like "shoestring", which is why this fungi is something called the shoestring fungi.

If a landowner needs assistance with armillaria root disease, please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-275-8453 or the ISU Plant Diagnostic Clinic at 515-294-0581. More information can be found here.

Figure 1. Armillaria rhizomorphs under the bark. (Image: Robert L. Anderson, USDA Forest Service, Bugwood.org).

United States Forest Service Major Pests List:
Asian long-horned beetle

Year: 2016
State: Iowa
Forest Pest
Common Name: Asian long-horned beetle
Scientific Name: *Anoplophora glabripennis*
Hosts: Maple, horsechestnut/buckeye, willow, elm, birch, and sycamore
Setting: N/A
Counties: N/A
Survey Methods: Ground
Acres Affected: N/A
Narrative: Asian long-horned beetle has not been identified in Iowa. In the past, state legislative funds allowed DNR to follow up on suspect maples in 2010, 2011, 2012 and 2013. The maples were selected from community inventories as having advanced dieback, large exit holes, and no obvious reason for the decline (e.g. girdling roots, construction damage, or planting depth).

However, due to shrinking budgets, no formal survey work was conducted for Asian long-horned beetle in 2016. DNR asks all citizens to assist in the future monitoring efforts of this pest.

If beetles are found (Figure 1.) contact Rhonda Santos (USDA Public Information Officer) at 508-852-8044 and Robin Pruisner (State Entomologist) at 515-725-1465. Asian long-horned beetle information can be found here.

Figure 2. Adult Asian long-horned Beetle (Image: Dennis Haugen, USDA Forest Service, Bugwood.org).

United States Forest Service Major Pests List:
Bur Oak Blight

Year 2016
State: Iowa
Forest Pest
Common Name: Bur Oak Blight
Scientific Name: *Tubakia iowensis*
Hosts: Bur oak
Setting: Rural Forests, Nursery, and Urban
Counties: Statewide (Hancock county added in 2016)
Survey Methods: Aerial, Ground, General Observation, and Culturing
Acres Affected: Approximately 1,200 acres
Narrative: Bur oak blight has been recognized in Iowa for only the last 11 years. However, it is suspected that the fungus that causes the disease has probably been here much longer. Theories on why bur oak blight has increased include: a shift in climate temperatures, more frequent rain events, older mature trees might be more susceptible, and that trees are more susceptible on sites that have a history of grazing or construction.

The disease can be found in most counties in Iowa, causing severe decline and mortality. Spring chemical injections with propiconazole (Alamo) seem to control bur oak blight. However, some chemical burning (phytotoxic effects of the chemical) does occur. This control method works well in urban settings.

Currently, control measures have not been identified for woodland trees. Severely declining bur oaks have been harvested (salvaged) before they die. The estimated acres affected reflect the approximate acres of woodland salvage cuts. This does not reflect the urban damage, which cannot be quantified at this time.

Research is being conducted on various native bur oaks that may have some tolerance to the bur oak blight fungus. Seeds have been collected from bur oaks that seem to show some resistance and are being grown and the DNR State Forest Nursery in hopes to prevent further damage. All samples bur oak blight should be sent into the ISU Plant Diagnostic Clinic at 515-294-0581.

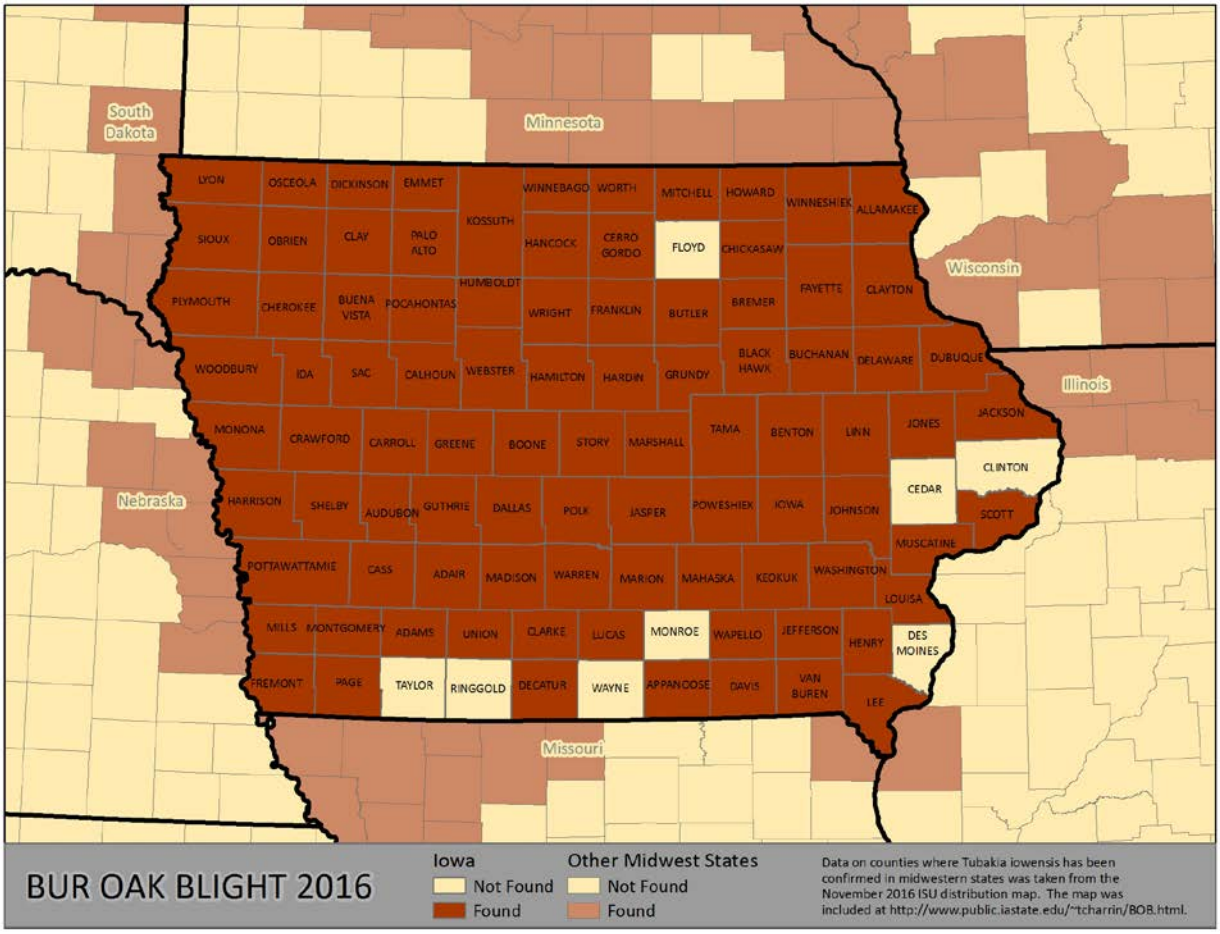


Figure 3. **Current map of known locations of bur oak blight. (Image: Created by DNR based on locations provided by Dr. Harrington, ISU).**

United States Forest Service Major Pests List: Butternut Canker

Year 2016
State: Iowa
Forest Pest
Common Name: Butternut Canker
Scientific Name: *Ophiognomonia clavigignenti-juglandacearum*
Hosts: Butternut
Setting: Rural Forest
Counties: Statewide
Survey Methods: General Observation
Acres Affected: Eastern half of Iowa (Scattered throughout roughly 2 million acres)
Narrative: Butternut canker is found throughout Iowa, but is largely concentrated in the Eastern half of Iowa where butternuts occur. The disease is fatal to native non hybrid butternuts.

No formal survey work was conducted on butternut canker in 2016. No suspect samples were submitted to DNR. No damage was reported in 20165.

If a landowner needs assistance with butternut canker, please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-275-8453 or the ISU Plant Diagnostic Clinic at 515-294-0581.

Figure 4. Examples of canker found on butternut trees (Image: Minnesota Department of Natural Resources Archive, Minnesota Department of Natural Resources, Bugwood.org).

United States Forest Service Major Pests List: Emerald Ash Borer

Year 2016
State: Iowa
Forest Pest
Common Name: Emerald Ash Borer
Scientific Name: *Agrilus planipennis*
Hosts: All Ash (*Fraxinus)* species
Setting: Rural Forest, Nursery, Urban
Counties: Adair, Adams, Allamakee, Appanoose, Black Hawk, Boone, Bremer, Cedar, Clarke, Clinton, Dallas, Davis, Des Moines, Dubuque, Harrison, Henry, Iowa. Jasper, Jefferson, Johnson, Keokuk, Lee, Linn, Louisa, Lucas, Mahaska, Marion, Monroe, Montgomery, Muscatine, Polk, Poweshiek, Scott, Story, Union, Van Buren, Wapello, Washington, and Winneshiek counties.
Survey Methods: Aerial, Ground, General Observation, and Trapping
Acres Affected: 268,102 aerial acres
Narrative: Emerald ash borer (EAB) was identified and confirmed in Iowa on May 14, 2010 on Henderson Island in Allamakee County. EAB has since been confirmed in 39 counties. Since the insect was already widespread, a statewide quarantine was issued February 4, 2014.

DNR visually inspected 119 ash trees in 13 counties in 2016. The surveys found EAB in Adair, Adams, Clarke, Harrison, Iowa, Johnson, Louisa, Van Buren, Washington, and Winneshiek counties.

Unlike previous years, purple traps were not placed on a grid by PPQ. Instead, they were made available to DNR and IDALS to place on suspect trees to help determine if EAB is present. This tool has helped to determine if EAB was present in trees that could not be bark peeled. None of the deployed purple traps were positive in 2016.

If a landowner has an ash tree that they believe has emerald ash borer please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-725-8453 or Mike Kintner (IDALS EAB Coordinator) at 515-725-2877. Emerald ash bore information can be found here and the Iowa DNR.

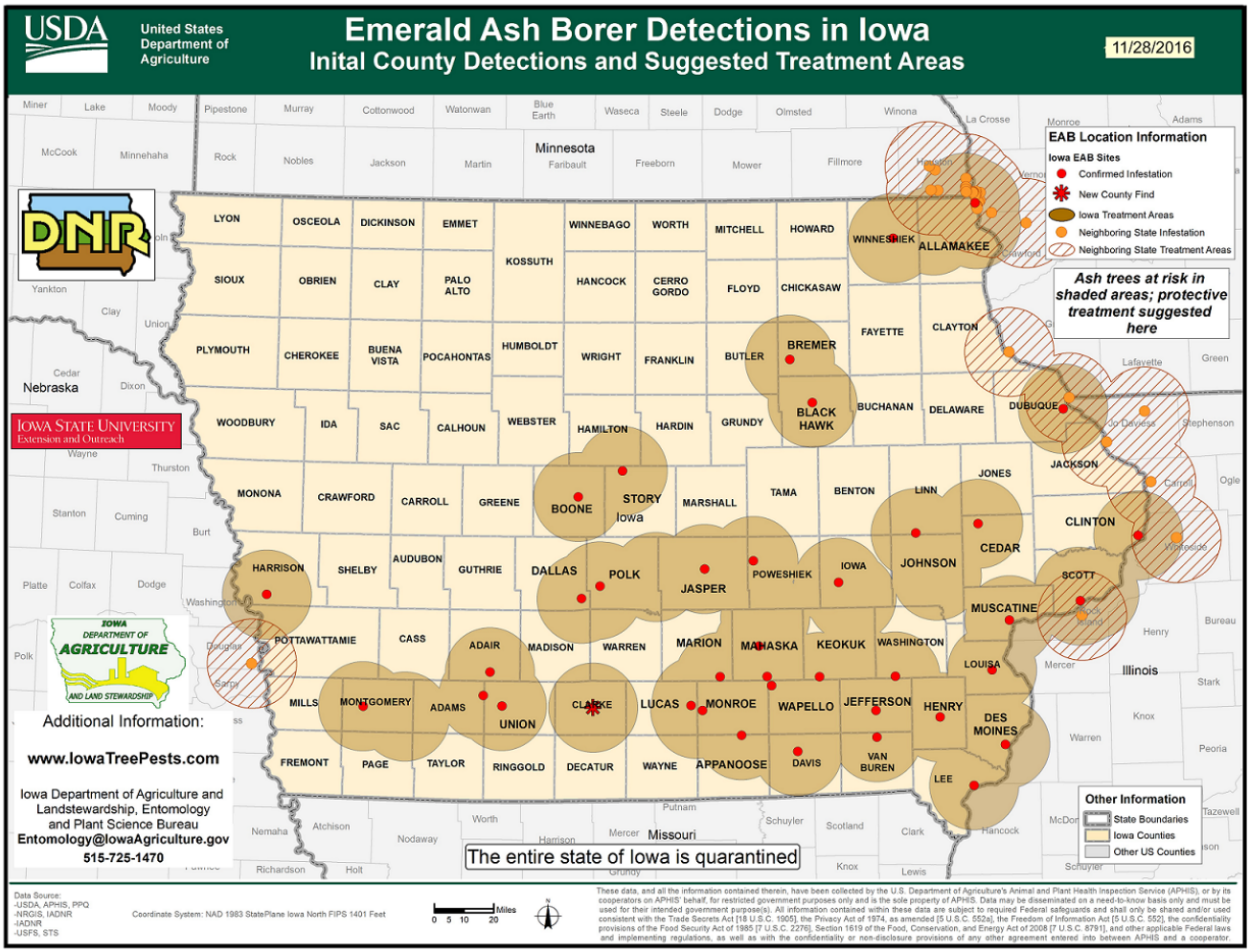

USDA
United States Department of Agriculture
Emerald Ash Borer Detections in Iowa
Inital County Detections and Suggested Treatment Areas
11/28/2016
EAB Location Information
Iowa EAB Sites
Confirmed Infestation
New County Find
Iowa Treatment Areas
Neighboring State Infestation
Neighboring State Treatment Areas
Ash trees at risk in shaded areas; protective treatment suggested here
DNR
Iowa State University Extension and Outreach
Iowa Department of Agriculture and Land Stewardship
Additional Information:
www.IowaTreePests.com
Iowa Department of Agriculture and Landstewardship, Entomology and Plant Science Bureau
Entomology@IowaAgriculture.gov
515-725-1470
The entire state of Iowa is quarantined
Other Information
State Boundaries
Iowa Counties
Other US Counties
Data Source:
-USDA, APHIS, PPQ
-NRGIS, IADNR
-IADNR
-USPS, STS
Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
Miles
0 5 10 20
These data, and all the information contained therein, have been collected by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), or by its cooperators on APHIS' behalf, for restricted government purposes only and is the sole property of APHIS. Data may be disseminated on a need-to-know basis only and must be used for their intended government purpose(s). All information contained within these data are subject to required Federal safeguards and shall only be shared and/or used consistent with the Trade Secrets Act [18 U.S.C. 1905], the Privacy Act of 1974, as amended [5 U.S.C. 552a], the Freedom of Information Act [5 U.S.C. 552], the confidentiality provisions of the Food Security Act of 1985 [7 U.S.C. 2276], Section 1619 of the Food, Conservation, and Energy Act of 2008 [7 U.S.C. 8791], and other applicable Federal laws and implementing regulations, as well as with the confidentiality or non-disclosure provisions of any other agreement entered into between APHIS and a cooperator.

Figure 5. Locations of the emerald ash borer infestations, as of November 2016. Please note that the entire State of Iowa is now quarantined for EAB. The target circles around each infestation represent a 15 miles radius. The target circles are done to assist landowners that are considering chemical treatments. The current recommendations from the Iowa EAB Team are not to chemically treat an ash tree until your property is within one of the target circles. (Image: Tivon Feeley, DNR)

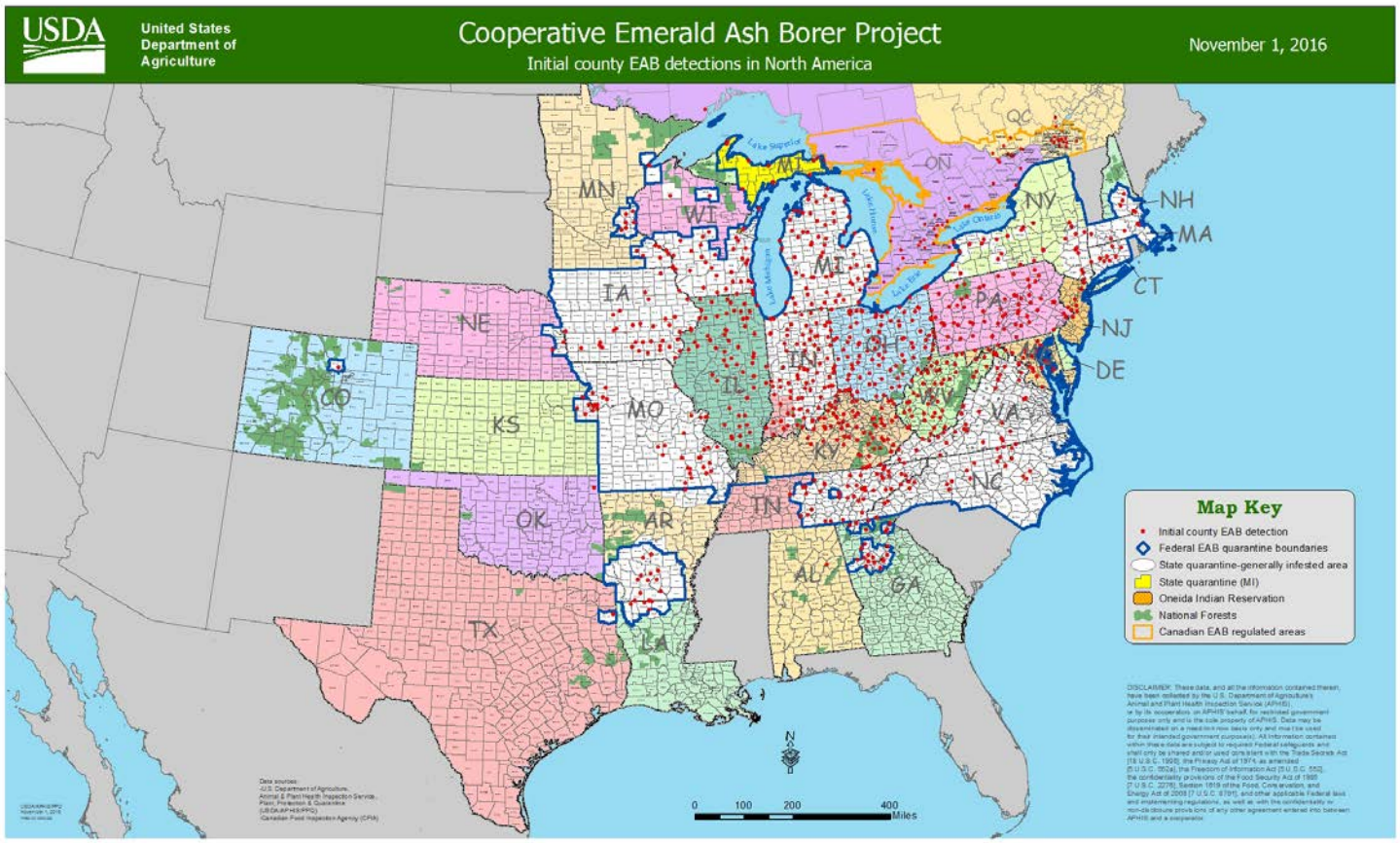


Figure 6. Locations of the current quarantined counties or states for emerald ash borer. DNR and partners will continue to trap and monitor the state through 2016. (Image provided by USDA-APHIS-PPQ)

United States Forest Service Major Pests List:
Forest Tent Caterpillar

Year 2016
State: Iowa
Forest Pest
Common Name: Forest Tent Caterpillar
Scientific Name: *Malacosoma disstria*
Hosts: Many tree species
Setting: Rural Forests and Urban
Counties: Allamakee, Winneshiek, Howard, Chickasaw, Fayette, Clayton, and Delaware
Survey Methods: Ground and General Observation
Acres Affected: Approximately 200 acres
Narrative: Iowa DNR started receiving reports of forest tent caterpillars in Northeast Iowa in late May. Forest tent caterpillars are native and commonly found throughout the United States. The forest tent caterpillars have regional outbreaks every 6 to 16 years.

This is the fifth year of outbreak of forest tent caterpillars. The populations have dropped as expected in 2016.

Figure 7. The picture above shows forest tent caterpillars on the main stem of a young tree. (Image: Robert Honeywell, DNR).

United States Forest Service Major Pests List:
Gypsy Moth

Year 2016
State: Iowa
Forest Pest
Common Name: Gypsy Moth
Scientific Name: *Lymantria dispar*
Hosts: Oak, spruce, maples, elms, and many more
Setting: Rural Forests and Urban
Counties: Statewide
Survey Methods: Pheromone Delta Traps
Acres Affected: None
Narrative: Gypsy moth has repeatedly been captured in Iowa, but the population level has effectively been controlled through trapping and mating disruption. Feeding damage has not occurred to Iowa's trees.

The 2015 capture of 338 male moths was high enough that three treatment sites were identified for 2016. Those treatment blocks totaled 13,520 polygon acres. Mating disruption, using BioFlakes, was used to treat all three blocks. A total of 10,200 acres, out of the estimated 13,520 polygon acres, were treated using BioFlakes.

During the 2016 trapping season, there were 141 male moths captured. There are seven areas to delimit in 2017 to ensure that Iowa does not have an isolated early infestation. There are no treatment sites identified for 2017. This is not the final moth count. More gypsy moth information can be found here.

STS Slow the Spread of the Gypsy Moth
Slow the Spread Foundation, Inc.

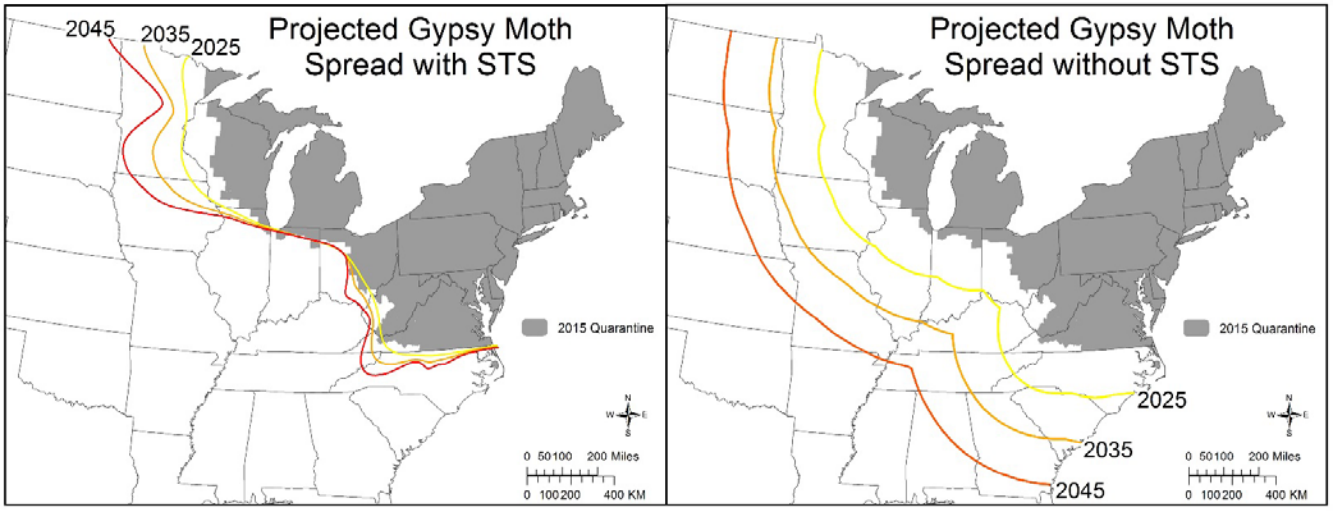
The Gypsy Moth Slow the Spread Foundation establishes a formal framework for cooperation among the ten states (listed at the bottom of page) who work with each other and the USDA to slow the spread of gypsy moth. Together they have achieved their goal of reducing spread of this destructive pest by more than 60%, which has prevented infestation of more than 140 million acres in 15 years.

The Threat: Gypsy moth is a destructive, exotic forest pest that feeds on over 300 species of trees. It was accidentally introduced into the United States in 1869 and is currently established throughout the northeast and parts of the upper mid-west (gray shaded area on maps), where it has defoliated 80 million acres since 1970.

- It feeds on over 300 species of trees but oaks are most preferred.
- Defoliation causes extensive tree mortality, reduces property values, adversely affects commerce and causes allergic reactions in sensitive individuals that come in contact with the caterpillars.
- Most of the susceptible hardwood forests in the United States are not yet infested and are still at risk.

The Benefits:

- Prevents invasion of more than 300 million acres over the next 30 years (compare maps).
- Protects the extensive urban and wild land hardwood forests in the south and upper mid-west while also protecting the environment through use of gypsy moth specific strategies.
- Yields a benefit to cost ratio of 3 to 1 by delaying the onset of impacts that occur as gypsy moth invades new areas. The 20-year net present value after subtracting costs ranges from 184 to 348 million dollars.
- Delays impacts associated with gypsy moth quarantines on intra- and inter-state commerce.
- Unifies the partners and promotes a coordinated, region-wide action based on biological need.



Illinois Indiana Iowa Kentucky Minnesota N.Carolina Ohio Virginia W.Virginia Wisconsin

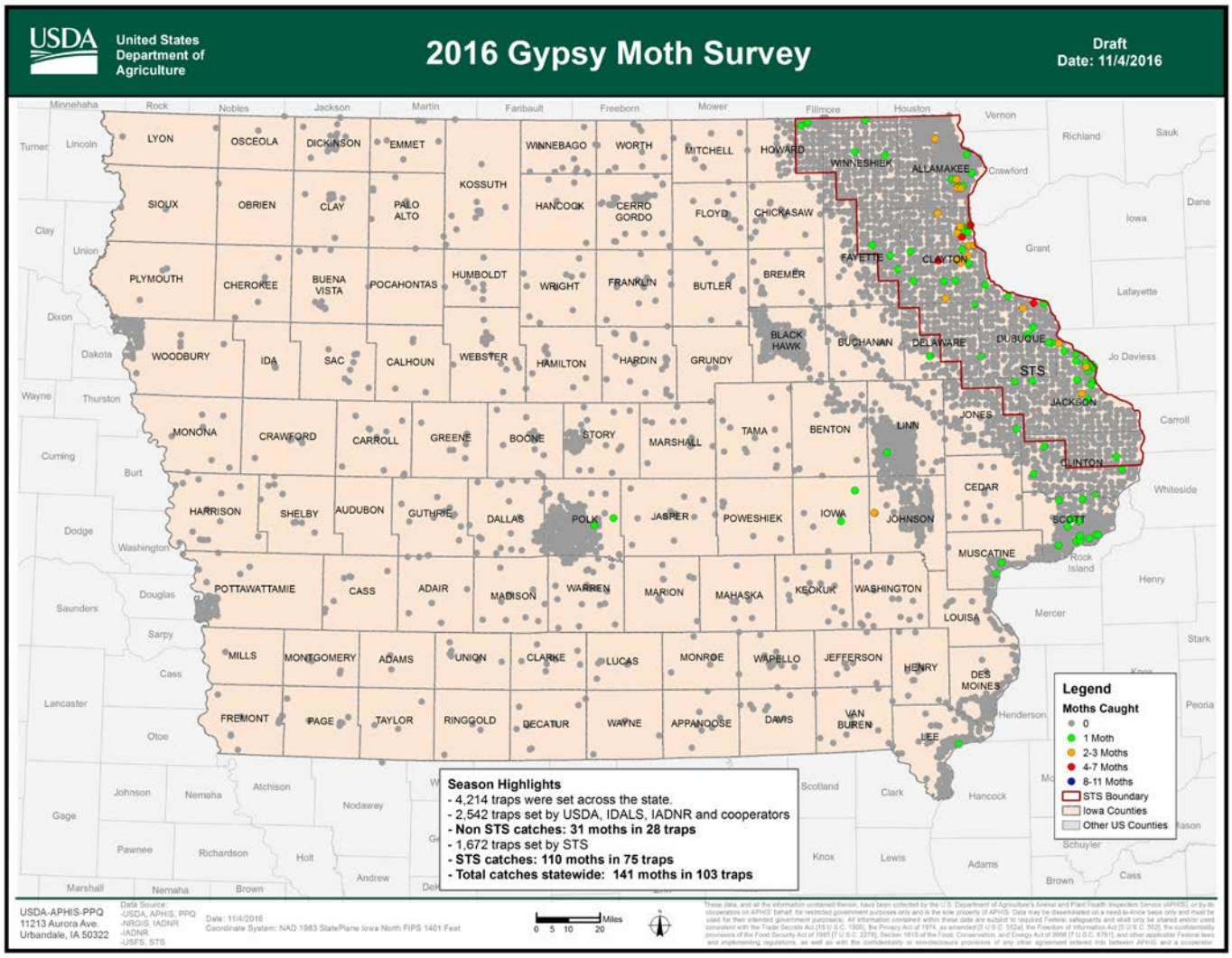


Figure 8. The map above details the locations of all the gypsy moth traps and the number of moths captured in them during the 2016 trapping season. The total male moth capture was 141 male moths. (Image: Tivon Feeley, DNR).

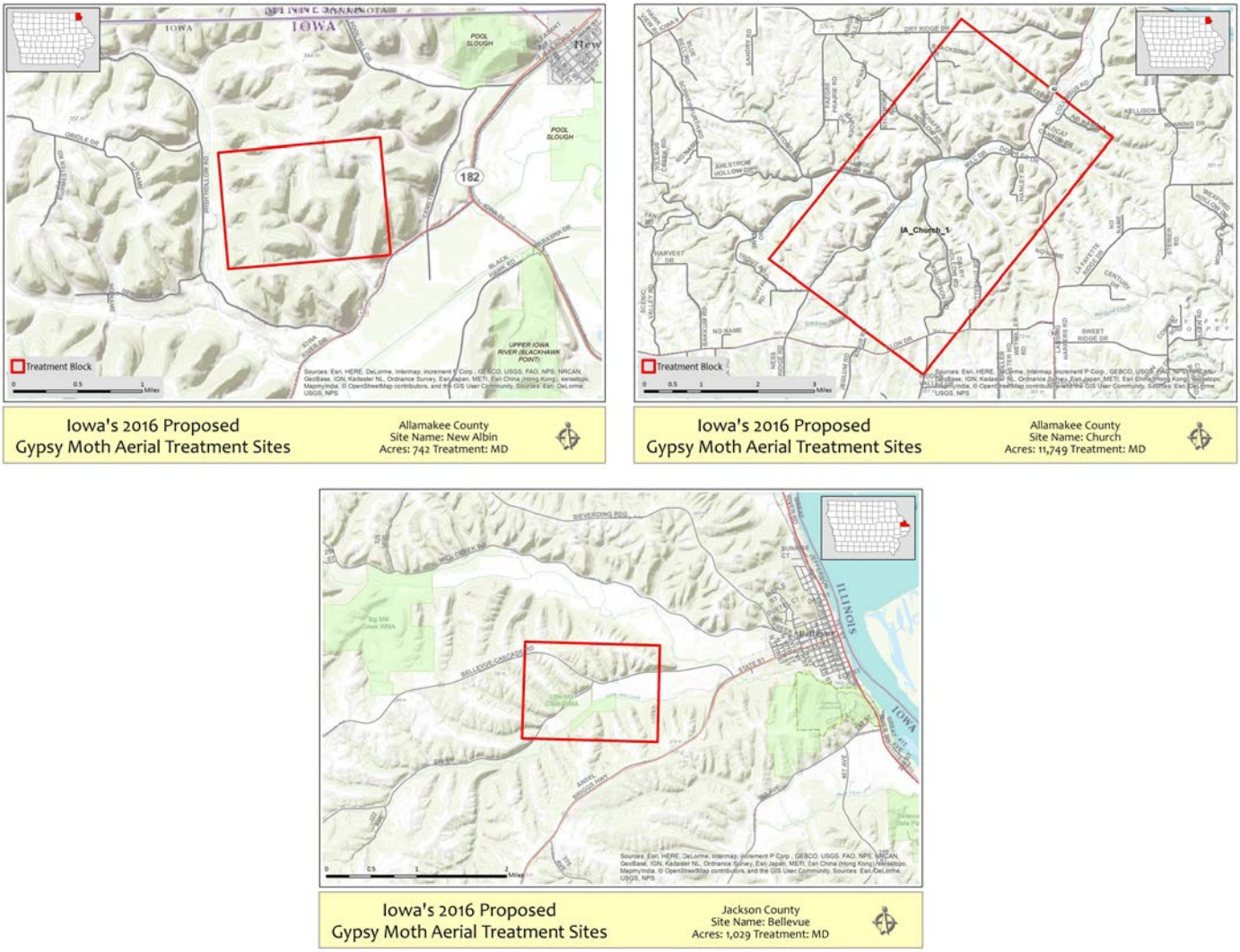


Figure 9. The maps above details the locations of the three treatment areas in Iowa totaling 13,520 polygon acres, of which 10,299 acres were treated with BioFlakes to disrupt mating. (Image: Tivon Feeley, DNR).

United States Forest Service Major Pests List: Heterobasidion Root Disease

Year 2016
State: Iowa
Forest Pest
Common Name: Heterobasidion root disease
Scientific Name: *Heterobasidion spp.*
Hosts: Conifers (All)
Setting: N/A
Counties: Lucas and Van Buren
Survey Methods: N/A
Acres Affected: N/A
Narrative: Heterobasidion root disease has been identified in Iowa, and is a pest that can occur throughout Iowa on pines or red cedar. Historically it has been reported on jack pine in Stephens State Forest. Survey work was conducted at Yellow River State Forest for Heterobasidion root disease. Heterobasidion root disease has not yet been identified at Yellow River State Forest. If a landowner suspects Heterobasidion root disease, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

Figure 10. Example of heterobasidion root disease. (Image: William Jacobi, Colorado State University, Bugwood.org)

United States Forest Service Major Pests List:
Oak Wilt

Year 2016
State: Iowa
Forest Pest
Common Name: Oak Wilt
Scientific Name: *Ceratocystis fagacearum*
Hosts: All Oak Species
Setting: Woodlands and Urban
Counties: Statewide
Survey Methods: Aerial and Ground
Acres Affected: 1,025 acres
Narrative: DNR received very few oak wilt samples this year. There were a total of 27 oaks tested for oak wilt and only 19 trees were positive for oak wilt. All trees were cultured and oak wilt was confirmed by fungal morphology.

The majority of the samples came from the southern half of Iowa. DNR followed up on the management plans implemented in 2016 and found very little evidence of oak wilt spread. At this time, it appears that the control efforts works have prevented the spread of oak wilt. DNR will continue to monitor these plots in 2016 to ensure that oak wilt remains under control

If a landowner feels that they have discovered oak wilt, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

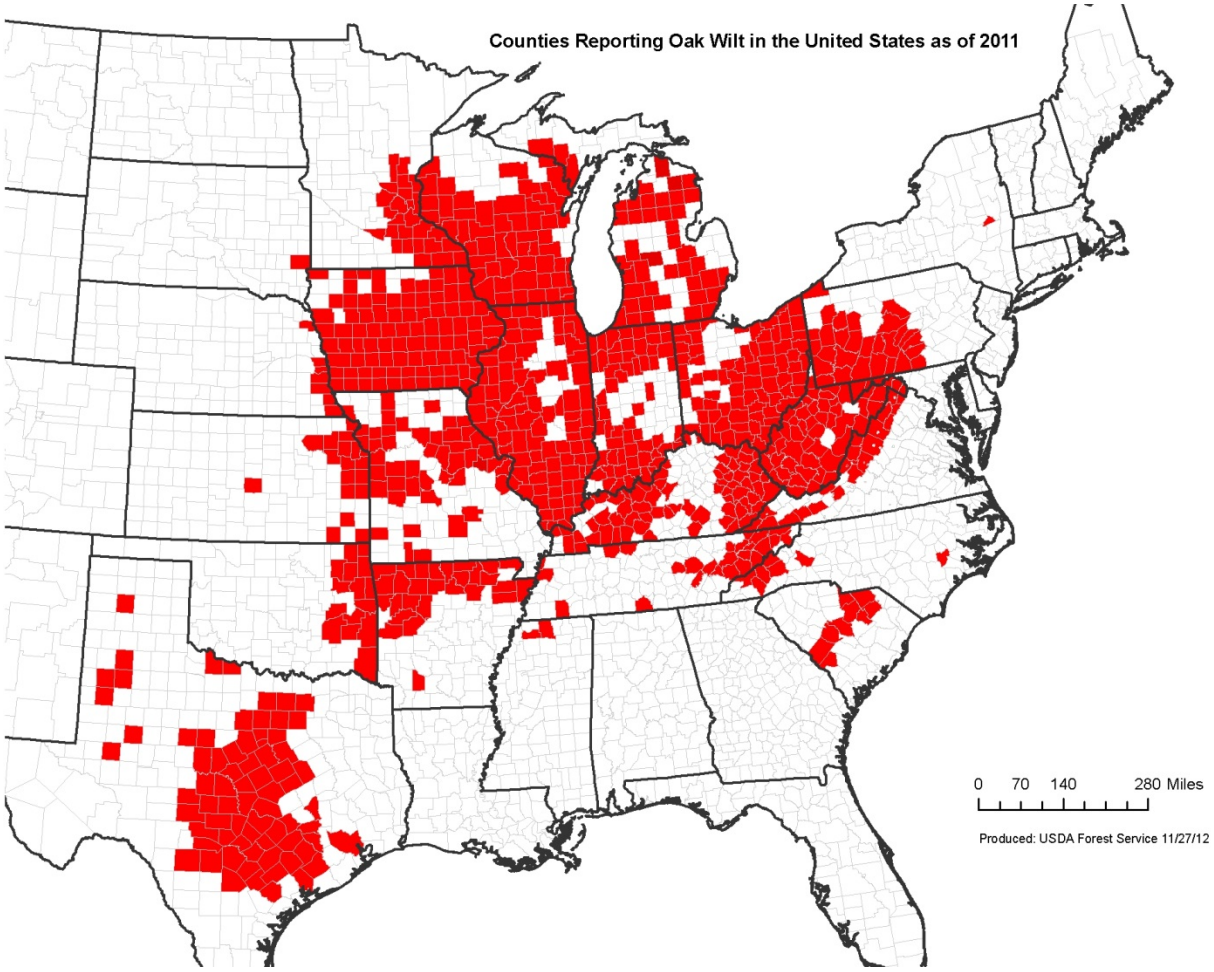
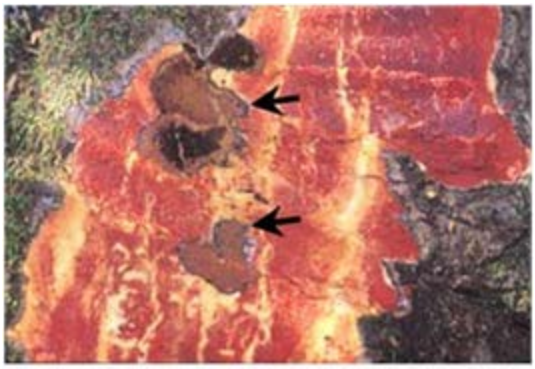


Figure 11. The map above details the counties in Iowa with confirmed oak wilt. Oak wilt may occur in the non-red counties, but has not been confirmed by the ISU Diagnostic Clinic. (Image: Quinn Chavez, USFS).

United States Forest Service Major Pests List: Sudden Oak Death

Year	2016
State:	Iowa
Forest Pest	
Common Name:	Sudden Oak Death
Scientific Name:	*Phytophthora ramorum*
Hosts:	All Oaks
Setting:	Rural Forests, Nursery, and Urban
Counties:	Statewide
Survey Methods:	Water Testing and Soil Testing
Acres Affected:	N/A
Narrative:	Iowa did not received any notice of "trace forward" of suspected sudden oak death in 2016, meaning that no potentially infected plant material had been shipped to Iowa. Stream baiting, to test for sudden oak death was not conducted in 2016 and is not planned for 2017. If a landowner suspects that they sudden oak death, please contact Tivon Feeley (DNR Forest Health Program Leader) at 515-725-8453 or Robin Pruisner (State Entomologist) at 515-725-1465.

Ooze bleeds from a canker on an infected oak.



Black zone lines are found under diseased bark in oak.

Figure 12. Two examples of the oozing canker found on an infected tree. The black lines under the bark are also symptomatic of sudden oak death. (Images: Joseph O'Brien, USDA Forest Service Pest Alert, and Bugwood.org)

United States Forest Service Major Pests List: Thousand Cankers Disease

Year	2016
State:	Iowa
Forest Pest	
Common Name:	Thousand Cankers Disease
Scientific Name:	*Pityophthorus juglandis and Geosmithia morbida*
Hosts:	Walnut
Setting:	Rural Forests, Nursery, and Urban
Counties:	Statewide
Survey Methods:	Ground, General Observation, and Culturing
Acres Affected:	None
Narrative	A total of 1,712 walnut trees were selected for the 2016 walnut twig beetle survey. A Lindgren four funnel dry trap with the walnut twig beetle pheromone developed by Contech was placed in a declining walnut tree for the survey.

The traps were left on the trees for three weeks before being moved to another tree during the months of May, June, and one week in July.

The following beetles were collected during the survey: *Xyleborus atratus, Ambrosiodmus tachygraphus, Hylocurus rudis, Xylosandrus germanus, Xyleborinus saxeseni, Xyloterinus politus, Xylosandrus crassiusculus, Pityophthorus lautus* (and subspecies), *Pityophthorus crinalis*, and *Pityophthorus consimilis*. There were a total of 12,203 ambrosia beeltes, Pityophthorus beetles, and weevils that were collected. **No walnut twig beetles were found during the survey**. There were numerous other beetles, not of concern, collected (i.e. Japanese beetle, June bugs, ect.) but not counted as part of the survey.

The highest beetle captures occurred during the months of May and June. The captures decreased after those months. These trends have been consistent over the last several years, indicating that the best time to capture *Pityophthorus* species in Iowa is May, June, and the first week of July.

If a landowner has walnut trees that they believe have thousand cankers disease, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

Figure 13. One of the Lindgen funnel traps that were used in conjunction with the walnut twig beetle pheromone. The traps were placed at sawmills, communities, and campgrounds. (Image: Shane Donegan, DNR)

Figure 14. A look inside the Lindgren Funnel trap capture chamber. The picture shows two pheromone pouches and a 3 inch long strip of dog collar that was used to kill the beetles that entered the capture chamber. (Image: Shane Donegan, DNR)

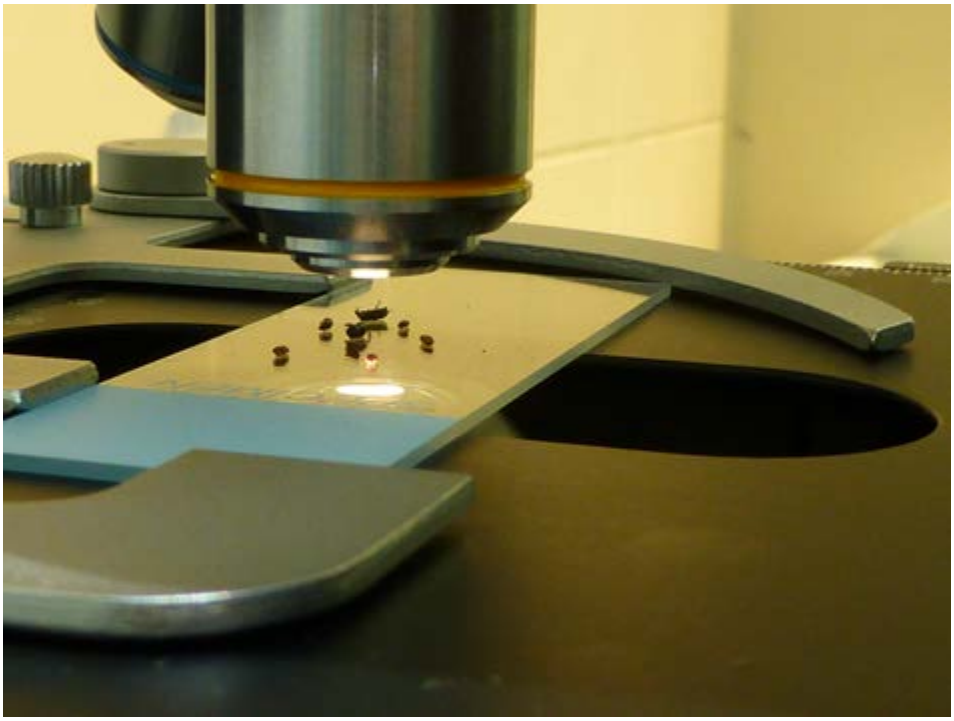


Figure 15. Microscopes were used to help identify the beetle captured. The walnut twig beetle is about 1/4 of an inch long. (Image: Shane Donegan, DNR)

Figure 16. Pictured above is a *Pityopthorus* sp. (not *P. juglandis*) that was captured and sent in for identification. (Image: Shane Donegan, DNR)

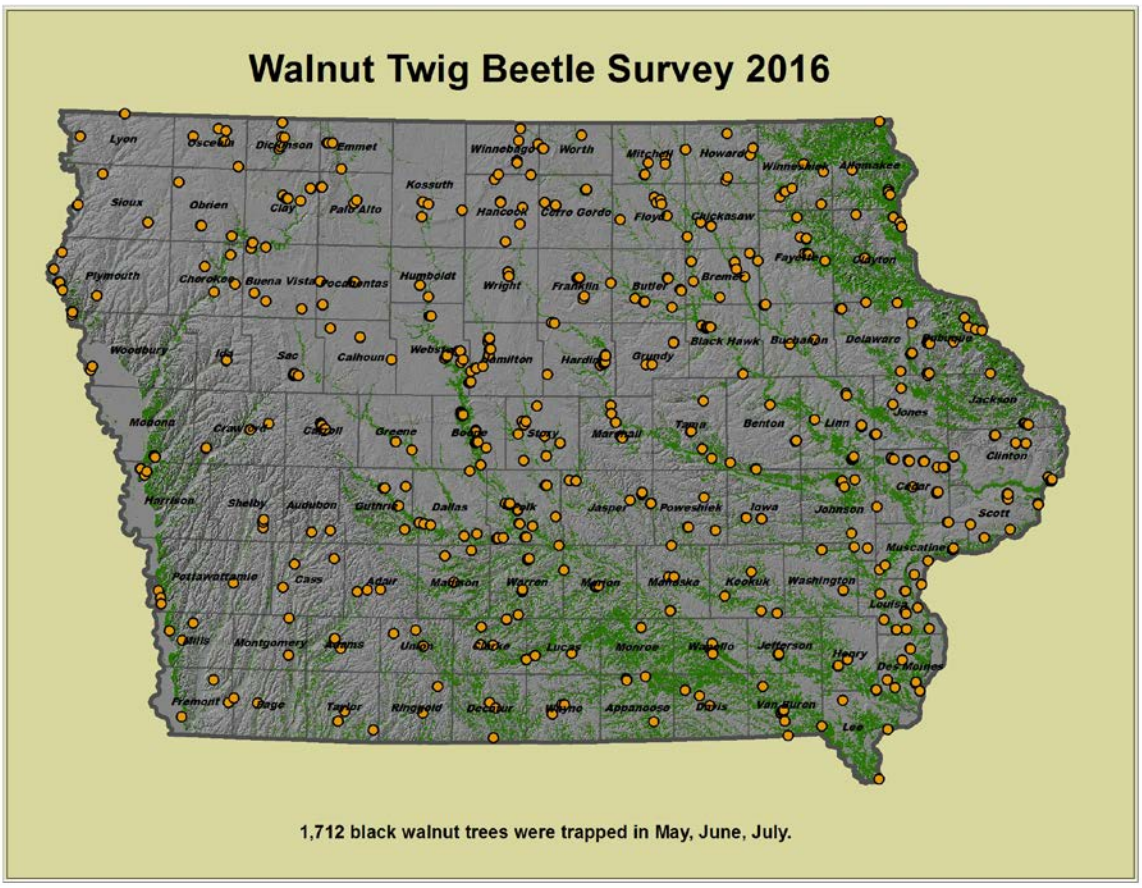


Figure 17. The locations of the 1,712 survey traps for walnut twig beetle throughout the state. (Image: Tivon Feeley, DNR)

United States Forest Service Major Pests List: Blister Rust

Year 2016
State: Iowa
Forest Pest
Common Name: White Pine Blister Rust
Scientific Name: *Cronartium ribicola*
Hosts: White Pine
Setting: N/A
Counties: N/A
Survey Methods: N/A
Acres Affected: Unknown
Narrative: White pine blister rust has been identified in Iowa, and is a pest that can occur throughout the native white pine range in Iowa. No additional funds were available to conduct survey work. No suspect samples were submitted to DNR or the ISU Plant Diagnostic Clinic. No other survey work was conducted for white pine blister rust. If a landowner suspects white pine blister rust they should contact the ISU Plant Diagnostic Clinic at 515-294-0581.

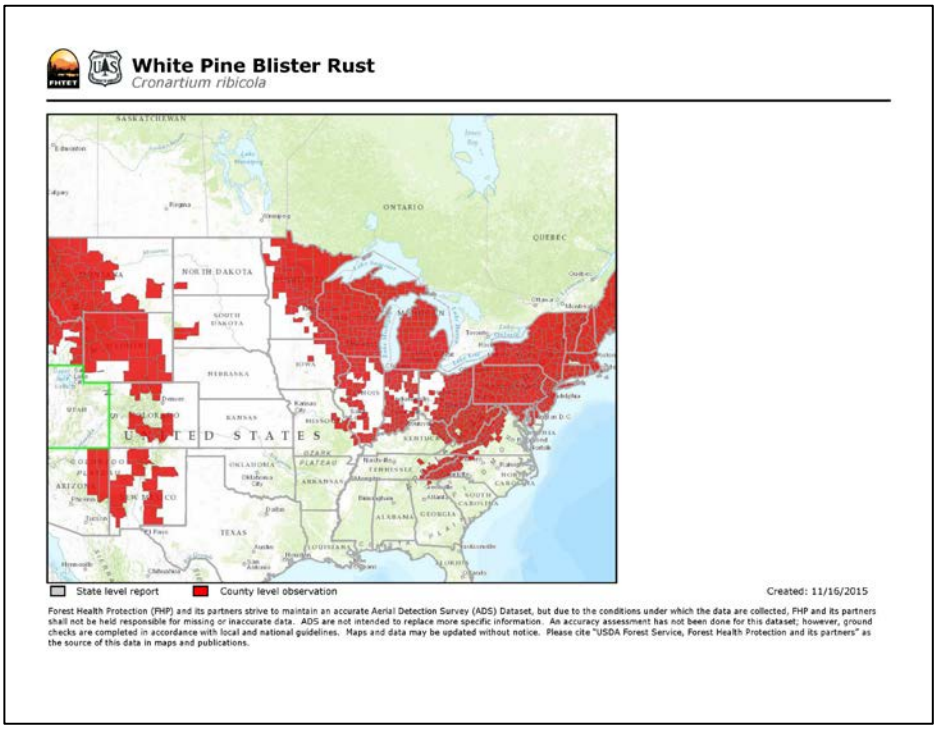

White Pine Blister Rust
Cronartium ribicola
SASKATCHEWAN
ONTARIO
QUEBEC
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
UNITED STATES
TEXAS
State level report
County level observation
Created: 11/16/2015
Forest Health Protection (FHP) and its partners strive to maintain an accurate Aerial Detection Survey (ADS) Dataset, but due to the conditions under which the data are collected, FHP and its partners shall not be held responsible for missing or inaccurate data. ADS are not intended to replace more specific information. An accuracy assessment has not been done for this dataset; however, ground checks are completed in accordance with local and national guidelines. Maps and data may be updated without notice. Please cite "USDA Forest Service, Forest Health Protection and its partners" as the source of this data in maps and publications.

Figure 18. The range map for known areas of white pine blister rust (Map: USFS FHTET)

Figure 19. Rust spores on an infected tree. (Image: Brian Geils, USDA Forest Service, Bugwood.org)

Additional Pest Surveyed:
Pine Shoot Beetle

Year 2016
State: Iowa
Forest Pest
Common Name: Pine Shoot Beetle
Scientific Name: *Tomicus piniperda*
Hosts: All Pines
Setting: Rural Forests, Nursery, and Urban
Counties: Statewide
Survey Methods: N/A
Acres Affected: Unknown
Narrative: Pine Shoot Beetle was identified September 18, 2006 and all counties in Iowa were quarantined for pine shoot beetle. Since the entire state is quarantined, no further monitoring has been needed. If a landowner needs assistance with management options for the pine shoot beetle, please contact the ISU Plant Diagnostic Clinic at 515-294-0581.

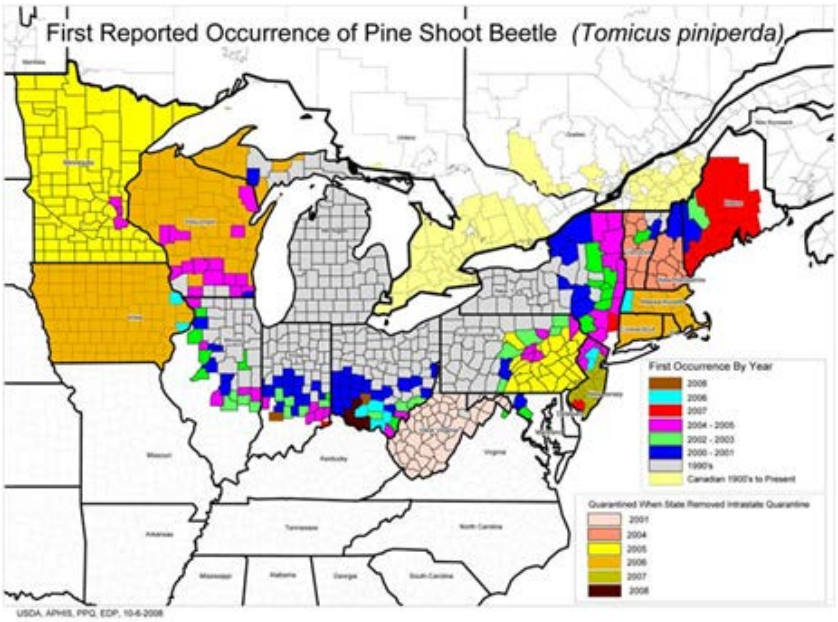


Figure 20. The map above shows the quarantined areas for pine shoot beetle. (Image: by USDA-APHIS-PPQ)

Pine Shoot Beetle Background

The pine shoot beetle (*Tomicus piniperda* L.) is an introduced pest that attacks pines. It was first discovered in the US at a Christmas tree farm near Cleveland, Ohio, in July 1992. A native of Europe, the beetle attacks new shoots of pine trees, stunting the growth of the trees. The pine shoot beetle may also attack stressed pine trees by breeding under the bark at the base of the trees. The beetles can cause severe decline in the health of the trees, and in some cases, kill the trees when high populations of the beetle exist.

In May, 2006, USDA-APHIS-PPQ confirmed the presence of pine shoot beetle (PSB) in Dubuque and Scott counties. A Federal Order was issued effective June 22, 2006 placing Dubuque and Scott counties under a Federal quarantine for interstate movement of PSB regulated articles. Iowa Department of Agriculture and Land Stewardship (IDALS) was provided a copy of the Federal Order as well as additional information concerning the pine shoot beetle, and was requested to consider placing a state PSB quarantine for intrastate movement of PSB regulated articles from Dubuque and Scott Counties. However, after considerable review, IDALS declined to implement an intra-state quarantine for PSB. Therefore, a Federal Order was issued effective September 18, 2006 for quarantine of the entire state of Iowa for PSB, *Tomicus* piniperda.

The quarantine affects the following pine products, called “regulated articles”:

- Pine nursery stock
- Pine Christmas trees
- Wreaths and garlands
- Pine logs/lumber (with bark attached)

All pine nursery stock shipped from Iowa to a non-regulated state must be inspected and certified free from PSB. This inspection and certification must occur just before shipping. Small pine seedlings (less than 36 inches tall, and 1 inch in diameter) and greenhouse grown pines require a general inspection of the whole shipment. All other (larger) pine nursery stock shipments must have 100% tip-by-tip inspection.

Figure 21. The picture above shows the pine shoot beetle and the damage it causes to branches. (Images: Steve Passoa, USDA APHIS PPQ, Bugwood.org)

Additional Pest Surveyed:
Dutch Elm Disease

Year 2016
State: Iowa
Forest Pest
Common Name: Dutch Elm Disease
Scientific Name: *Ophiostoma ulmi or Ophiostoma novo-ulmi*
Hosts: Elm
Setting: Rural Forests and Urban
Counties: Statewide
Survey Methods: Ground, General Observation, and Culturing
Acres Affected: All native elm
Narrative: Dutch elm disease was introduced to North America in the 1930's and began killing millions of native elm trees. Dutch elm disease has been identified in all of Iowa's counties, and it's estimated that just over 95 percent of the urban elm trees have succumbed to this disease.

The fungus is native to Asia and was introduced to Europe shortly after World War I. From Europe, it traveled to North America in the 1930's in crates made from infected elm logs. The disease quickly infected elms across the United States since our native elms did not have natural resistance to the introduced pathogen.

Dutch elm disease was reported statewide in 2016. The 2016 season appeared to have a high occurrence of Dutch elm disease.

Figure 22. Areas were Dutch elm disease is generally known to occur within the continental United States. (Image: Tivon Feeley, DNR)

Additional Pest Surveyed:
Hickory Dieback

Year 2016
State: Iowa
Forest Pest
Common Name: Hickory Dieback
Scientific Name: *Fusarium solani* and *Ceratocystis smalleyi*
Hosts: Bitternut Hickory and Occasionally Shagbark Hickory
Setting: Rural Forests and Urban
Counties: Statewide
Survey Methods: General Observation
Acres Affected: Approximately 1000 acres
Narrative: Hickories have continued to decline statewide. Mortality has become fairly common within the range of bitternut hickory making it difficult to track and estimate the acres impacted. If a landowner suspects hickory mortality, they should contact the ISU Plant Diagnostic Clinic at 515-294-0581.

Figure 23. Hickory bark beetle attack. (Image: Dr. Jennifer Juzwik, USFS)

Figure 24. Associated cankers. (Image: Dr. Jennifer Juzwik, USFS)

Additional Pest Surveyed:
Invasive Plants

Exotic invasive species are plants that are non-native to an ecosystem and cause or are likely to cause economic or environmental harm to humans, crops, livestock, or natural plant and animal communities. The most common non-native species found in the FIA report as problematic in Iowa forests are multiflora rose, reed canarygrass, bush honeysuckle, garlic mustard, Japanese knotweed, autumn olive, common buckthorn, Japanese barberry, and oriental bittersweet (These are alarming forest health trends. (Miles, P.D. Wed Mar 25 20:46:53 MDT 2016. Forest Inventory DataMart web-application version 1.6.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station.).

These invasive and exotic plants are out competing native forest species, diminishing fisheries and wildlife habitat, reducing water quality, reducing economic returns from forest management and tourism, and threaten long term forest sustainability and bio-diversity. In 2013 Oriental bittersweet, Japanese knotweed, garlic mustard, and Japanese hops were made illegal to distribute in the State of Iowa.

Known Invasive Plants in Iowa 2016

Key: NP= Not Present- Not known to exist in Iowa
I= Isolated- the species is infrequent, not commonly seen
LA= Locally Abundant- the species is present but is not in the majority of the counties
W= Widespread- commonly seen in the majority of counties in large or small populations

Species	Common Name	Abundance
Abutilon theophrasti	Velvetleaf	W
Ailanthus altissima	tree-of-heaven	W
Alliaria petiolate	garlic mustard	W
Berberis thunbergii	Japanese barberry	W
Bromus tectorum	cheatgrass	W
Butomus umbellatus	flowering rush	I
Carduus acanthoides	plumeless thistle	I
Carduus nutans	Musk thistle	W
Celastrus orbiculata	Oriental bittersweet	LA
Centaurea maculosa/beibersteinii	spotted knapweed	LA
Centaurea repens	Russian knapweed	I
Centaurea solstitialis	yellow starthistle	I
Cirsium arvense	Canada thistle	W
Cirsium spp.	thistle	W
Cirsium vulgare	bull thistle	W
Conium maculatum	poison hemlock	I
Coronilla varia	crown vetch	W
Daucus carota	Queen Anne's lace	W
Dipsacus fullonum/sylvestris	common teasel	I
Dipsacus laciniatus	cutleaf teasel	I
Dipsacus sativus	Indian teasel	NP
Elauagnus angustifolia	Russian olive	I
Elaeagnus umbellate	autumn olive	LA
Euonymus alatus	burning bush	LA
Euphorbia esula	leafy spurge	W

Species	Common Name	Abundance
Fallopia japonica	Japanese knotweed	LA
Frangula alnus/Rhamnus frangula	glossy buckthorn	I
Heracleum mantegazzianum	giant hogweed	NP
Hesperis matrionalis	dame's rocket	W
Humulusjaponicus	Japanese hop	LA
Lespedeza cuneata	Sericea lespedeza	I
Ligusturm japonicum	Japanese privet	NP
Ligustrum obtusifolium	blunt-leaved or border privet	I
Ligustrum sinense	Chinese privet	NP
Ligustrum vulgare	common or European privet	I
Lonicera fragrantissima	fragrant honeysuckle	NP
Lonicera japonica	Japanese honeysuckle	LA
Lonicera maackii	Amur honeysuckle	W
Lonicera standishii	Standish's honeysuckle	NP
Lonicera tatarica	Tatarian honeysuckle	W
Lonicera x *bella*	Bell's honeysuckle	I
Lonicera xylosteum	European fly honeysuckle	NP
Lythrum salicaria	purple loosestrife	W
Morus alba	white mulberry	W
Pastinaca sativa	wild parsnip	W
Potamogeton crispus	curlyleaf pondweed	I
Pueraria montana	kudzu	I
Rhamnus cathartica	common buckthorn	W
Rosa multiflora	multiflora rose	W
Tamarix spp.	salt cedar	I

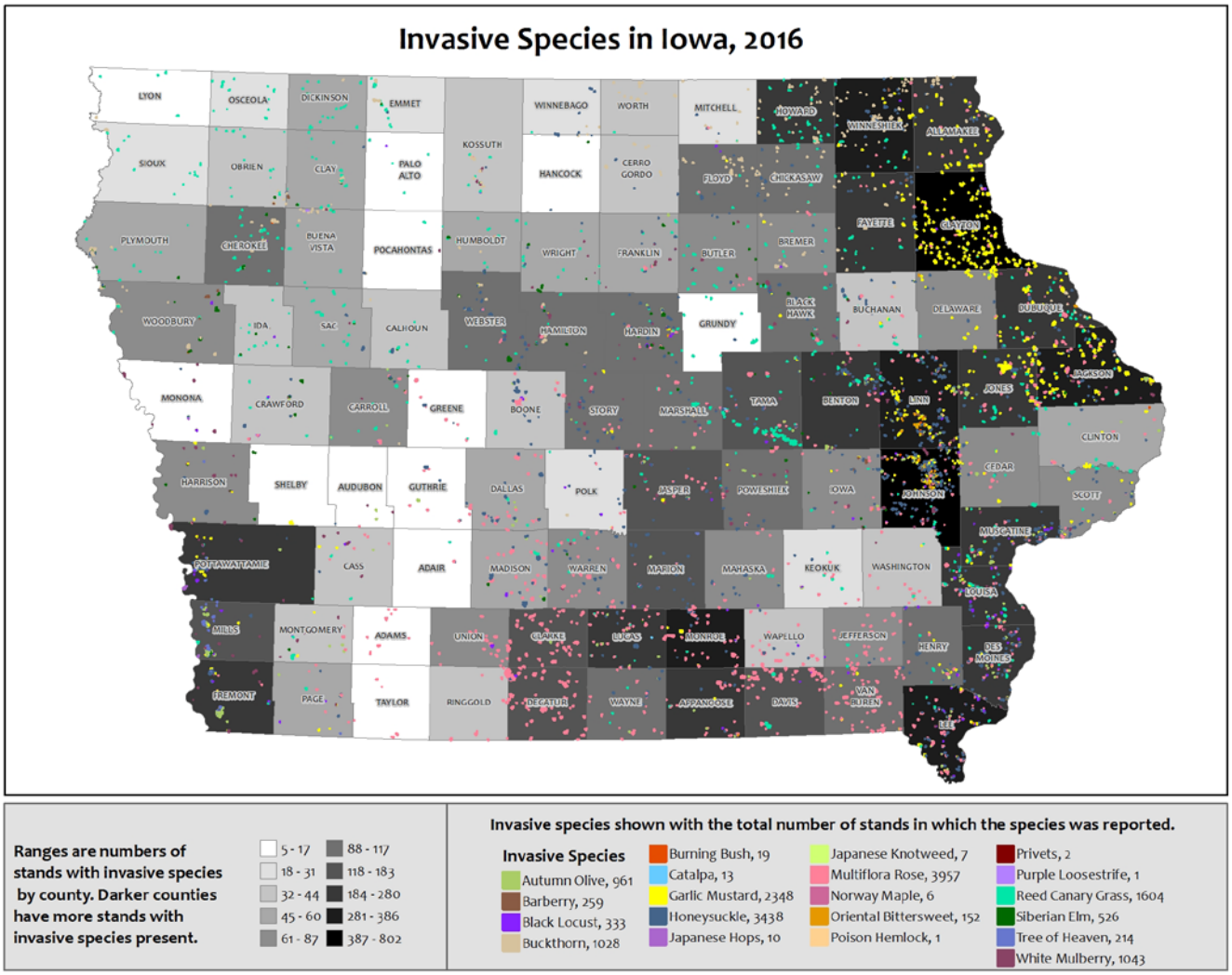


Figure 25. The map above details the locations of invasive species as identified by DNR District Foresters and the Forest Health Program Leader in 2016. (Image: Tivon Feeley, DNR)

State of Iowa

Executive Department

IN THE NAME AND BY THE AUTHORITY OF THE STATE OF IOWA

PROCLAMATION

WHEREAS, millions of dollars, both public and private, are spent each year for the control of invasive plants, insects, diseases, and animal species in Iowa's woodlands and urban areas; and

WHEREAS, invasive species, such as emerald ash borer and oriental bittersweet, threaten Iowa's ecosystem by competing with and destroying native trees, and by disrupting the natural complex habitat system; and

WHEREAS, Iowa's woodlands, wildlands, and waterways draw hundreds of thousands of tourists and recreational users each year; and

WHEREAS, awareness of invasive species is an important first step towards behavior change, which can prevent the introduction and spread of invasive species; and

WHEREAS, Invasive Species Awareness Month is an opportunity for government to join forces with business, industry, conservation groups, recreation groups, community organizations, and citizens to take action against the introduction and spread of invasive species:

NOW, THEREFORE, I, Terry E. Branstad, Governor of the State of Iowa, do hereby proclaim the month of June, 2016 as

INVASIVE SPECIES AWARENESS MONTH

in Iowa.

IN TESTIMONY WHEREOF, I HAVE HEREUNTO SUBSCRIBED MY NAME AND CAUSED THE GREAT SEAL OF THE STATE OF IOWA TO BE AFFIXED. DONE AT DES MOINES THIS 3rd DAY OF JUNE IN THE YEAR OF OUR LORD TWO THOUSAND SIXTEEN.

TERRY E. BRANSTAD
GOVERNOR OF IOWA

ATTEST:

PAUL D. PATE
SECRETARY OF STATE

Aerial Survey

Each year the DNR utilizes an airplane and a tablet with mapping software on it to track forest health issues from above the tree canopy. A total of 820,255 acres of land were surveyed this year. The 2016 survey found silver maple and swamp white oak trees throughout the state continued showing chlorotic (yellowing) leaves. It does not appear that this condition is solely site related. Soil samples taken during 2016 determined this is not a nutrient deficiency problem. DNR will continue to monitor the chlorotic trees to see if there is a correlation with other events.

Most counties along the flight route showed signs of Dutch elm disease and high level of bur oak blight. Scattered trees with lace bug damage were noticed throughout the state, with most of the tree damage occurring in Eastern Iowa. The aerial flights found the same levels of pine wilt and much lower levels of oak wilt than those that were noted in the 2015 aerial survey. The aerial flight continued to find large pockets of aspen declining in NE Iowa that has been the trend for the past four years. The cause of the aspen decline is unknown at this time. This is the third year that ash decline and mortality associated with EAB has been observed in the aerial surveys. This occurred only in areas where EAB was known to be established and the damage was very noticeable in the air. Numerous conifers suffered severe winter desiccation, as detailed in the introduction. Overall, there were significantly higher forest health issues that were observed in the 2016 aerial survey. Bur oak blight and emerald ash borer were commonly seen impacting Iowa's landscape during this survey. A total of 268,102 polygon acres of EAB were mapped in 2016.

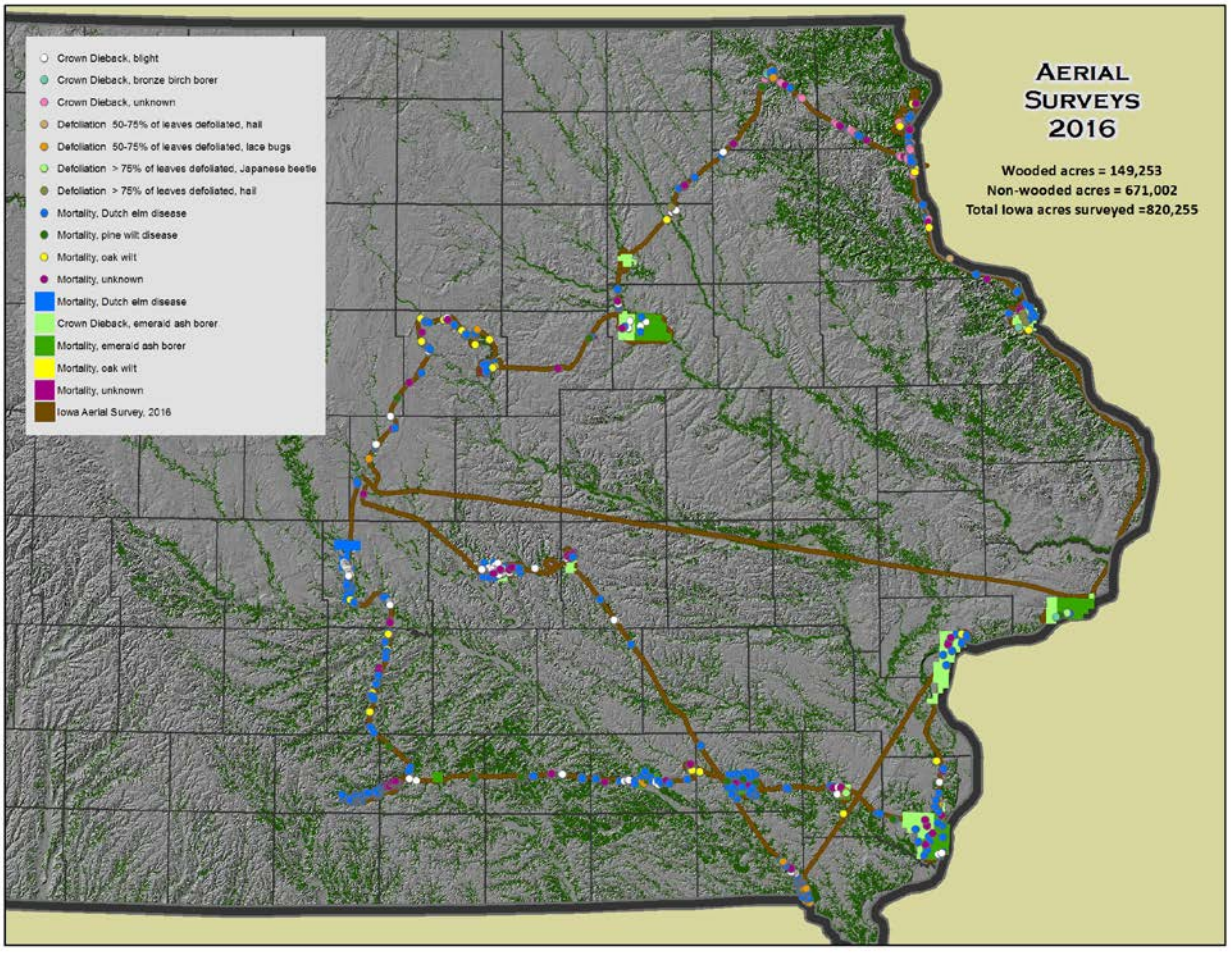

Crown Dieback, blight
Crown Dieback, bronze birch borer
Crown Dieback, unknown
Defoliation 50-75% of leaves defoliated, hail
Defoliation 50-75% of leaves defoliated, lace bugs
Defoliation > 75% of leaves defoliated, Japanese beetle
Defoliation > 75% of leaves defoliated, hail
Mortality, Dutch elm disease
Mortality, pine wilt disease
Mortality, oak wilt
Mortality, unknown
Mortality, Dutch elm disease
Crown Dieback, emerald ash borer
Mortality, emerald ash borer
Mortality, oak wilt
Mortality, unknown
Iowa Aerial Survey, 2016
AERIAL SURVEYS 2016
Wooded acres = 149,253
Non-wooded acres = 671,002
Total Iowa acres surveyed =820,255

Figure 26. The map above shows the flight lines where the aerial mapping took place. (Image: Tivon Feeley, DNR)

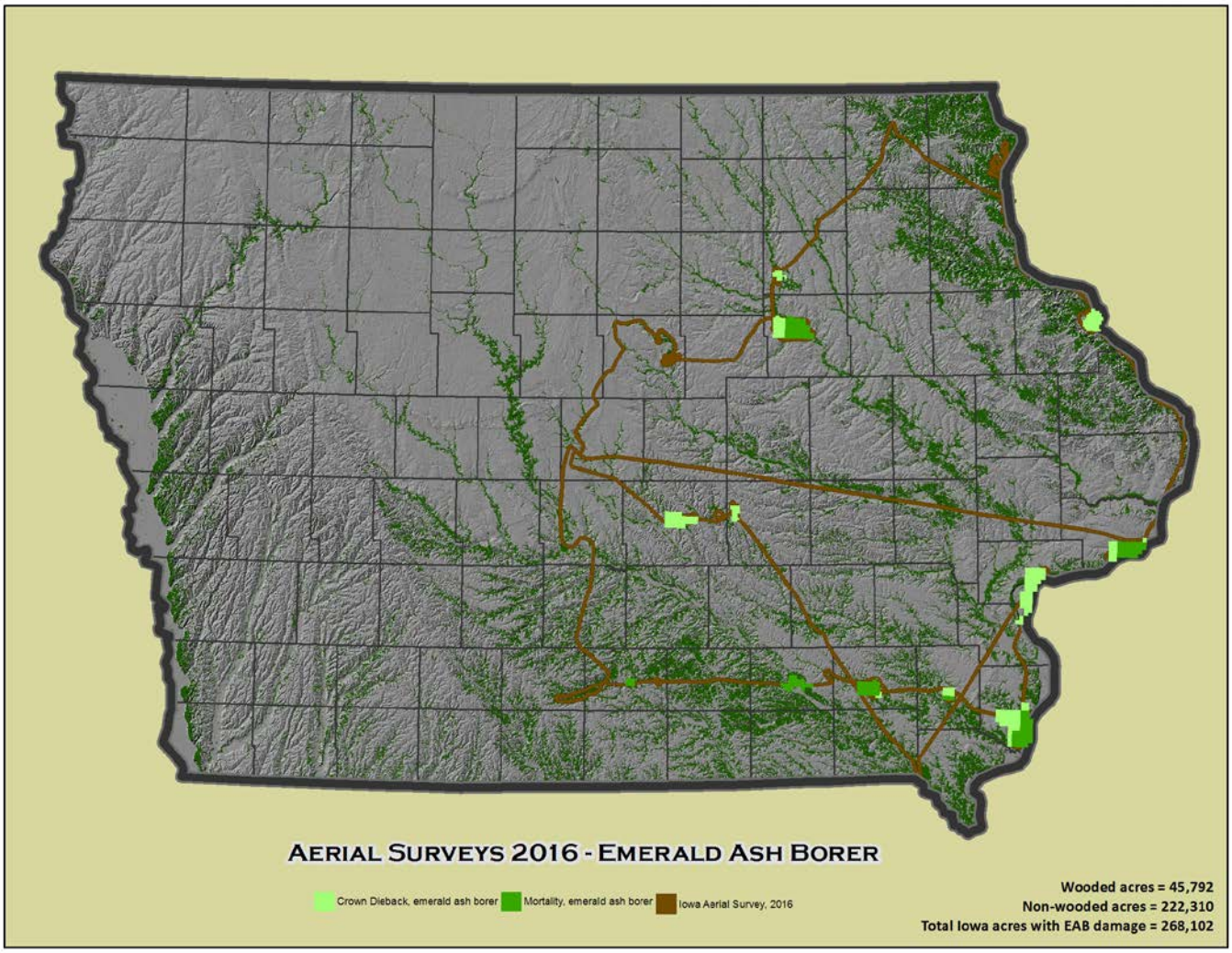

AERIAL SURVEYS 2016 - EMERALD ASH BORER
Crown Dieback, emerald ash borer
Mortality, emerald ash borer
Iowa Aerial Survey, 2016
Wooded acres = 45,792
Non-wooded acres = 222,310
Total Iowa acres with EAB damage = 268,102

Figure 27. The map shows the polygon acres of emerald ash borer damage that was mapped out in 2016. This does not reflect the total number of trees within that polygon. (Image: Tivon Feeley, DNR)

Conclusion

Management plays an important role in creating a healthy Iowa forest. The best insurance a person can have when managing their woodlands is diversity of tree species with the appropriate number of trees per acre. These simple management strategies may help prevent excessive tree loss from a single pest and help maintain the trees' vigor, which may make them more resistant to potentially destructive insects and diseases. The best management plan for community forests is to not have more than 10% of any one species represented. Iowa forests play an important role by providing abundant forest products and amenities, including outdoor recreation opportunities, wildlife habitat, water quality, human health, and the economic benefits of a vast array of wood and wood fiber products.

Iowa's forests are facing an unprecedented level of invasive pests, chemical damage, wildlife pressure, and improper management. Emerald ash borer, gypsy moth, bur oak blight, and thousand cankers disease on walnut could have a 91.6 billion dollar impact on Iowa's woodlands and community trees. No longer will passive management allow for woodlands to be "preserved" in the condition that they are in today. Learning about your woodlands and how each component affects another will make it easier for Iowa's woodlands to be managed for long term health. If you need technical assistance with your woodlands contact your district forester for assistance.

The Bureau of Forestry, through cooperation with other agencies, has programs in place to monitor forest stressors which have potential to move into Iowa and damage our forests. Those programs operated vigorously during 2016, and plans are in place for a similar continued vigorous forest health program operation in 2016. Those programs existed in part from funding received by USFS grants and the State of Iowa Woodland Health Appropriation.

However, budget constraints limit the amount of work for important matters such as: oak tatters, aspen decline, additional oak wilt pockets, and the much needed additional community assistance in managing new emerald ash borer infestations. Additional funds are needed for these important forest health issues to be addressed in 2016.

DNR would like to thank its collaborators from USDA-Forest Service, USDA-APHIS-PPQ, Iowa State University Extension, Iowa Department of Agriculture and Land Stewardship, and Department of Natural Resources Foresters.

"There are those who say that trees shade the garden too much, and interfere with the growth of the vegetables. There may be something in this: but when I go down the potato rows, the rays of the sun glancing upon my shining blade, the sweat pouring down my face, I should be grateful for shade."
-Charles Dudley Warner

Useful Phone Numbers and Websites

DNR Forestry Bureau has an updated forest health page.

DNR maintains an emerald ash borer resource page.

Iowa Department of Agriculture and Land Stewardship Tree Health Page.

Iowa State University's Pest Management and the Environment page host information on emerald ash borer, gypsy moth, and much more.

The Iowa State University Plant Disease Clinic has been assisting Iowa for nearly 50 years and is still available to answer plant disease questions. From flowers to trees they are ready to help. Contact them at 515-294-0581 or check them out here.

For the creepy and crawling things on your plants, don't forget to contact Iowa State University Extension Entomology. They can help you identify the insect and discover the best control measures. Contact them 515-294-1101.

Check out the DNR landowner assistance web page.

Be sure to look at the updated Iowa DNR website.

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